II Semester M.B.A. (Day) Degree Examination, June/July 2012
(2007-08 Scheme)
Management
Paper – 2.6 : QUANTITATIVE METHODS AND OPERATION RESEARCH

Time : 3 Hours   Max. Marks : 75

Instruction : Answer all the Sections. Calculators are allowed.

SECTION – A

1. Answer **any six** questions :   (6×2=12)

   a) What is degeneracy ?

   b) What is unbalanced assignment ?

   c) Distinguish between static and dynamic model.

   d) What is simulation ?

   e) Mention the assumptions of EOQ model.

   f) What are the significance of VAM ?

   g) What do you mean by decoupling inventory ?

   h) What is a float ?

SECTION – B

Answer **any three** questions :   (3×8=24)

2. "Operation Research replaces management by personality" Discuss.

3. What is a game in game theory ? What are the properties of a game ? Explain the 'best strategy' on the basis of minimax criterion of optimality.

4. A transportation equipment manufacturer uses rivets at an approximately constant rate of 2500 kgs. per year. The cost of rivets is Rs. 40 per kg. The company purchase manager estimates that it costs Rs. 200 to place an order and that the carrying cost of inventory is 10% p.a.

   a) How frequently should orders for rivets be placed and what quantities should be ordered ?

   b) If the ordering cost is Rs. 470 per order and 15% for carrying cost, how would the optimal policy change ? How much is the company losing per year because of imperfect cost information ?

5. A salesman travels from one place to another the tour that will minimize the total distance of visiting all cities and returning home. The distance (in km) between pairs of cities are given below :

<table>
<tr><td></td><td></td><td colspan="4">To city</td></tr>
<tr><td></td><td></td><td>P</td><td>Q</td><td>R</td><td>S</td></tr>
<tr><td rowspan="4">From city</td><td>P</td><td>∞</td><td>15</td><td>25</td><td>20</td></tr>
<tr><td>Q</td><td>22</td><td>∞</td><td>45</td><td>55</td></tr>
<tr><td>R</td><td>40</td><td>30</td><td>∞</td><td>25</td></tr>
<tr><td>S</td><td>20</td><td>26</td><td>38</td><td>∞</td></tr>
</table>

Use the assignment method to determine the tour that will minimize the total distance of visiting all cities and returning home.

6. A book store wishes to carry a particular book in stock. Demand is not certain and there is a lead time of 2 days for stock replenishment. The probabilities of demand are given below :

Demand (units/day) :	0	1	2	3	4
Probability :	0.05	0.10	0.30	0.45	0.10

Each time an order is placed, the store incurs an ordering cost of Rs. 10 per order. The store also incurs a carrying cost of Re. 0.5 per book per day. The inventory carrying cost is calculated on the basis of stock at the end of each day. Orders 5 books when present inventory plus any outstanding order falls below 8 books. Currently (beginning of 1st day) the store has a stock of 8 books plus 6 books ordered two days ago and are expected to arrive next day. Carryout simulation for 10 days. Random numbers for 10 days are given below :

89   34   78   63   61   81   39   16   13   73

SECTION – C

Answer **any two** questions :   (2×12=24)

7. a) Explain the principal assumptions made while dealing with sequencing problem.

   b) What is replacement ? Describe some important replacement situations.

8. Use the simplex method to solve the following LPP.

   Maximize $Z = 3x_1 + 5x_2 + 4x_3$

   S.T $2x_1 + 3x_2 \leq 8$

   $2x_2 + 5x_3 \leq 10$

   $3x_1 + 2x_2 + 4x_3 \leq 15$

   and $x_1, x_2, x_3 \geq 0$.

9. Consider the following table :

Activity	Predecessor Activity	t_o	t_m	t_p
A	–	2	3	10
B	–	2	3	4
C	A	1	2	3
D	A	4	6	14
E	B	4	5	12
F	C	3	4	5
G	D,E	1	1	7

   1) What is the probability that the project shall be complete within a period of 13 weeks.

   2) What is the probability that the project is completed within 11 and 16 weeks ?

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SECTION – D

10. Case study (**Compulsory**) :   (1×15=15)

A company has four factories F_1, F_2, F_3 and F_4 manufacturing the same product. Production and raw material costs differ from factory to factory and are given in the following table in the first two rows. The transportation costs from the factories to sales depots S_1, S_2, S_3 are also given. The last two columns in the table give the sales price and the total requirement at each depot. The production capacity of each factory is given in the last row.

	F_1	F_2	F_3	F_4	Sales Price/unit	Requirement
Production cost/unit	15	18	14	13		
Raw material cost/unit	10	9	12	9		
Transportation cost/unit	–					
S_1	3	9	5	4	34	80
S_2	1	7	4	5	32	120
S_3	5	8	3	6	31	150
Production Capacity	10	150	50	100		

Determine the most profitable production and distribution schedule and the corresponding profit. The surplus production should be taken to yield zero profit.

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